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AUTHOR Stotsky, Sandra L.
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ABSTRACT

The major purpose of this research was to show how specific theoretical principles and criteria could be integrated and supported by empirical data to provide a rationale for more systematic introduction of vocabulary in middle-grade reading-instruction material. Research was limited to the teaching of prefixes and the use of prefixed words. A content analysis of six widely used reading series (Allyn & Bacon; Macmillan; Ginn 360; Scott, Foresman; Holt; and Ginn 720) and their accompanying workbooks for grades two to six showed that sufficient opportunities for systematic vocabulary development with respect to most prefixes do not exist at many grade levels in these series. The following reasons were offered: (1) a general lack of coordination between what is suggested for teaching in the teachers' guides and the material in the corresponding reading selections in the readers or workbooks, and (2) a basic misunderstanding of prefixation in all the reading series, according to definition. Implications and references are included. (MB)

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Sandra L. Stotsky
Harvard University

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VOCABULARY: A MAJOR FACTOR IN READING COMPREHENSION

PURPOSE

This study sought to develop a useful and theoretically sound rationale for introducing vocabulary in middle-grade reading instructional material. It was hoped that this rationale could provide more systematic opportunities for strengthening and enhancing children's knowledge of words and, consequently, their reading comprehension.

BACKGROUND

The following research findings, observations, and theoretical issues guided this research.

The importance of vocabulary in reading comprehension has been consistently reported in different areas of reading research. Chall (1958) found in a critical review of readability formulas that a measure of vocabulary load was the major factor in almost all readability formulas. Studies of children's language development show a high correlation between pre-schoolers' knowledge of word meanings and achievement in reading at higher grade levels (e.g., Loban, 1970). Factor analyses of component skills in reading comprehension point to a knowledge of words as the essential component in reading comprehension (e.g., Davis, 1971). Further, a summary of research findings from studies in the teaching of vocabulary (Petty, Herold, & Stoll, 1968) indicates that some systematic attention to vocabulary teaching is better than no attention at all. Nevertheless, it is difficult to find more than a handful of studies within the past decade concerned with the teaching of vocabulary (Dale, Razik, &

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Petty, 1973), in contrast to the large numbers published in previous decades. In the most recent annual summaries of investigations in reading (Weintraub et al., 1974-1975; 1975-1976), only one study is cited (Tuinman & Brady, 1974) that focuses on the teaching of vocabulary.

An examination of the way in which new words are introduced in reading series for the elementary grades (Harris & Jacobson, 1973-1974) indicates that vocabulary seems to be introduced primarily on the basis of frequency of use in written material. An inspection of several current reading series (listed below) suggests that vocabulary is also determined by idiosyncratic usage in literary selections. When literary selections are adapted, there appears to be no indication of the principles followed in the choice of words. It is highly rational in beginning readers to teach children to read words which are in their oral vocabulary and which are among the most frequent words in written material as well. However, too much reliance on the principle of frequency beyond the decoding stages or on exposure to a richer (and possibly uncontrolled) variety of words in literary selections may not be sound from a long-range point of view if it precludes the possibility for more systematic development of a reading vocabulary.

In 1974, O'Rourke proposed a planned program of vocabulary development that contains as its nucleus the study and use of generative roots and affixes. This program would foster the systematic expansion of children's knowledge of words by enabling students to transfer the meaning of an element learned in one word to other words containing that element. To help decide which elements should

be taught first, O'Rourke proposed several criteria: (1) high visibility, (2) high productivity, and (3) the use of known words before the use of unknown words. However, he did not suggest how these principles and criteria could be integrated into the design of a developmental reading program on a sound empirical basis.

PROBLEM

This study sought to show how the principles and criteria proposed by O'Rourke could be integrated and supported by empirical data to provide a rationale for more systematic introduction of vocabulary in reading instructional material. Because it was not possible to deal with all categories of word elements, the scope of this research was limited to the teaching of prefixes and the use of prefixed words. Six widely-used reading series and their accompanying workbooks (grades 2 to 6) were surveyed to determine: (1) how prefixes are taught, (2) what prefixes are taught, (3) in what order, (4) at what grade levels, and (5) how many exemplars of the prefix are offered in meaningful reading material. Findings from this survey could provide data from which to judge whether or not current series provide sufficient opportunities for expanding children's knowledge of words and whether or not another rationale could be considered.

PROCEDURES

The first problem was to decide upon the definition of the term prefix to be used. According to Marchand (1969), whose work is considered by Aronoff (1976) as the most comprehensive text on the subject of English word-formation, prefixes are defined as "bound morphemes which are preposed to free morphemes" (p. 129). Marchand

emphasizes that "only such particles as are prefixed to full English words of general, learned, scientific or technical character can be termed prefixes" (p. 132). For example, hyper- in hypersensitive is a prefix, but hyper- as in hypertrophy is not, as -trophy is not an autonomous English word in the sense required. By definition, then, the elements ad- in adjacent, ex- in expect, post- in postpone, pre- in prefer, com- in companion, ob- in obstacle, de- in determine, etc. are not prefixes in these words because they are not prepœsed to independent or base words. They are etymological elements attached to roots in non-composite words (i.e., words that cannot be analyzed on the basis of English word-formation). Indeed, such elements as com-, ob-, and ad- are never prefixes.

Second, the following six reading series were selected for the survey:

(1) Allyn & Bacon Basic Reading Series (1968)
(2) Macmillan Reading Program, Revised Edition (1970)
(3) Ginn 360 Reading Series (1970)
(4) Scott Foresman Reading Systems (1971-1972)
(5) Holt Basic Reading System (1973)
(6) Ginn 720 Reading Series (1976)

They were chosen because: (1) they are among the most widely-used series in this country; (2) they range in terms of date of publication from the 1960's to the present, thus reflecting differing theoretical issues over the past decade influencing the construction of reading instructional material; and (3) they represent a rough balance from those tending to use more adapted or constructed selections to those tending more to use unadapted literary selections. To judge from the information in the acknowledgment pages at the beginning of the readers, the Allyn & Bacon, Macmillan, and Ginn 360 series appear to contain a rough balance between adapted and unadapted selections; the Holt and Scott-Foresman series tend to contain more unadapted literary

selections, and the Ginn 720 series seems to fall between these two groups.

Third, all of the reading material in the pupil readers and workbooks at each grade level in all series was read word by word. For each grade level in each series, tables were constructed containing all exemplars of prefixes taught at that grade level and at previous grade levels. The data in the tables were drawn only from the material in the readers and workbooks which required either meaningful reading or writing of prefixed words; this criterion excluded words listed for purposes of alphabetizing, stress placement, etc. It should be noted that the listing of a word in the tables indicated only appearance, not frequency.

FINDINGS

Table 1 indicates at what grade level each prefix was first introduced or mentioned in the six series. Only un-, re-, dis-, in-, and im- were introduced in all series by grade 4. Considerable variation in the order of introduction was found for all the other prefixes. It should be noted that many prefixes were not introduced at all. It is not clear from the reading series themselves or from any research literature why these omissions occurred or what rationale might provide the basis for the order of introduction of prefixes in general. It is clear only that many common prefixes used in elementary reading material are not taught in all series.

An inspection of the total number of exemplars for most prefixes in the tables accompanying each series revealed no large differences between the series published earlier (Allyn & Bacon, Macmillan, and Ginn 360) and those published later (Scott-Foresman, Holt, and Ginn 720). However, with the exception of the Allyn & Bacon series,

which tended to have fewer exemplars than all of the other series, there were more exemplars of all prefixes in general in the Macmillan and Ginn 360 series. This indicates that series which have more of a balance between constructed or adapted reading selections and unadapted literary selections seem to provide more exemplars of prefixes than do those series tending more to use unadapted literary selections. Since all prefixes listed in Table 1 were not taught in all series, it was not possible to make an exact overall comparison of the total number of exemplars across series. However, several tables were constructed comparing the total number of all exemplars of two selected prefixes from all series. Table 2 contains all words prefixed by dis- that appear in all the readers for grades 4, 5, and 6; their appearance and total by grade level are indicated within each series. Table 3 contains all words prefixed by un- in all grade 4 readers. Note that the Macmillan and Ginn 360 series provided more different exemplars than the other series. Subject to future research which would take into account the total frequency of appearance of all prefixed words (whether taught as such or not), the data in Tables 2 and 3 suggest that an overemphasis on the use of unadapted literary selections, as in the Scott-Foresman or Holt series, may provide fewer opportunities for systematic vocabulary development than a more balanced use does.

An inspection of the tables also revealed a paucity or total absence of exemplars for many prefixes at many grade levels throughout these series. The following reasons were offered to account for this scarcity:

a. There seems to be a lack of coordination between what was suggested for teaching (or mentioned) in the teachers' guides and what was available in the corresponding reading selections in the readers or workbooks. Sometimes prefixes were mentioned in the introduction of a manual or even indexed in a workbook, but never taught in the guide or exemplified in the entire reader or workbook for that grade level. Quite often prefixes were suggested for teaching in exercises in the guides but only one or two exemplars (if any at all) appeared in the reading selections. In general, very few corresponding workbook pages contained an exercise for a prefix suggested for teaching in the guide.

b. There appears to be a misunderstanding of prefixation in all the reading series, according to the definition that was followed in this research. Distinction was usually not made between prefixed words, such as remake, precaution, or defrost, and words with initial etymological elements, such as reflect, prefer, or deliver, which are not susceptible to analysis on the basis of English word-formation. Thus, many words offered as examples of prefixed words were incorrect, misleading, or useless for teaching or learning pruposes.

CONCLUSIONS

It was judged that sufficient opportunities for systematic vocabulary development with respect to most prefixes do not exist at many grade levels in these series. When the rationale is stated, the choice of vocabulary appears to be governed either by idiosyncratic usage in literary selections or by the principle of frequency or the degree of regularity in sound to symbol correspondence. Overall, the analysis of these six reading series indicated the need for another rationale for choice of vocabulary that could provide more oppor-

tunities for strengthening and expanding children's knowledge of words than the use of existing principles by themselves seem to offer at present.

FORMULATION OF ANOTHER RATIONALE

In his program for systematic vocabulary development, O'Rourke (1974) proposed several criteria, described above, for deciding which elements should be taught first. It was concluded that these criteria could be applied to the teaching of prefixes because: (1) prefixes are relatively unknown morphemes attached to base words which are usually already known (e.g., pre-season), (2) prefixes usually have only one or two invariant meanings, (3) the meaning of a prefix can usually be added literally to the meaning of the base word (e.g., pro-war), (4) prefixes are by definition active or productive elements which are used with countless words, and (5) most prefixes have invariant graphic forms. Thus, it would be easier for students to learn the meaning of prefixed words (e.g., prejudge) before learning, on the basis of derivation, the meaning of words containing an initial etymological element (e.g., preliminary).

The next thrust of this investigation was to show how the systematic teaching of prefixes and the use of prefixed words could be integrated into the design of a developmental reading program on a sound empirical basis. The principle of frequency is a rational principle (students should to some extent always be learning the most frequent words used in written language). Thus, it was necessary to show how empirical data could support modification of the principle of frequency so that opportunities for greater transfer of meaning could be structured into reading instructional material.

The first set of empirical data that was used appears in Table 4.

In this table are listed alphabetically on the left 48 prefixed words as exemplars of eight prefixes. These specific prefixes were chosen because they range from some of the prefixes most frequently taught in the six series to some of those least frequently taught. The specific words were chosen because they all appear at least once in Carroll et al. (1971). The table indicates, first, for each of these prefixed words, the frequency per grade level in Carroll et al. For example, counteract appeared once in grade 5. Under the columns RO-PW and RO-BW are numbers which indicate the rank order (RO) in the Carroll list of the prefixed word as printed (PW) and the base word as printed (BW). For example, counteract has the number 24800-24900 beside it, which means the prefixed word is within the 24800 to 24900 most frequent words in their total sample. The number under BW indicates the rank of the base word as printed in that prefixed word. The numbers under the columns HJ-PW and HJ-BW are the average grade level placements of the prefixed word (PW) and the base word (BW) from Harris and Jacobson (1972).

An inspection of these data revealed several interesting facts about prefixes and prefixed words in general. First, all of these prefixed words have a rank order listing that is higher, i.e., they are less frequent, than the rank order listing for the base word. Second, almost all of the base words are well within the 5000 most frequent words, regardless of the frequency of the prefixed word. Third, within each group of words prefixed by the same prefix, the variation in terms of the difference between the rank order listing

of the prefixed word and that of its base word is enormous. For example, fortune is within the 4000 most frequent words, misfortune within the 10,000 most frequent words; leading is within the 1700 most frequent words, but misleading within the 14,000 most frequent words. The great variation in the difference between the frequency in written language of similarly prefixed words and the frequency of their bases exists for all prefixes.

It was concluded from these data that all the prefixes in Table 1 could be taught after grade 3 as there are base words within the most common words of our language available for prefixation by all these prefixes. Once the child is taught the meaning of a prefix as one new lexical item, he can literally add its meaning to a number of words within his reading vocabulary, if not within his oral vocabulary as well. Thus, selected exemplars of all these prefixes can legitimately be used in reading selections throughout the middle grades (the basis for selection will be discussed later).

Despite their generally high rank order listing, it should be pointed out that prefixed words are really not very difficult words. They are less frequent and more difficult than their bases, but their meanings are not as difficult as non-composite words with similar frequencies. For example, superstars falls within the 54,200 to 54,300 frequency rank; so does sundry, subsidize, and teleology. The reason for their relative ease in comprehension is the fact that they contain both an initial element whose meaning is fairly stable and a common word which retains its literal meaning when prefixed. The infrequency of prefixed words in word frequency lists is probably due to the fact that many prefixes can be attached to an extraordinarily

large number of base words and they are optional linguistic devices for expressing meaning. For example, instead of a transoceanic voyage, one can write a voyage across the ocean. Thus, there seems to be no valid reason for the great disparity that exists, when one is constructing a reading vocabulary, between the grade level placement of the base word as indicated in Table 4 and the grade level placement of the prefixed word.

The second set of empirical data that was used to support modification of the principle of frequency came from children's written production of prefixed words in meaningful sentences. In Table 5 are listed a number of exemplars of several different prefixes from the Rinsland (1945) list, based on writing samples from 1% of elementary schoolchildren in this country. Beside each word is a number indicating its frequency of occurrence at each grade level from 1 to 8. These data reveal several interesting facts: (1) children in the primary grades clearly use prefixed words, and (2) children are capable of using a number of different prefixes in the primary grades.

It was concluded from these data that if children from the primary grades on are capable of using a large number of different prefixes, depending upon their need for a particular word in a specific piece of writing, then it would seem reasonable to suggest not only that prefixed words in general may not be difficult for children to learn, but also that there may not be a specific order for the introduction and teaching of many prefixes. In other words, it would seem that the use of a particular prefix is more a function of the availability (knowledge) of the base word and the need for the use of the prefixed word than it is of a clear order of difficulty

for all prefixes. If children by the fourth grade level are capable of using many differently prefixed words in their free writing, then it would be reasonable to conclude that a large number of prefixes could justifiably be taught at or by that grade level as part of their reading vocabulary.

Evidence was gathered on a related issue. Do children learn the meanings of prefixed words they read as discrete lexical items or as words consisting of known base words qualified by a dependent semantic element? In Table 6 are listed a number of prefixed words tested by Dale-Eichholz (1960), none of which appears in Carroll et al. (1971) before grade 4, and none of which is listed at all in Harris & Jacobson (1972). The high familiarity scores for these words by fourth graders suggested that children's knowledge of these less frequent words (in both oral and written language) may reflect more a general understanding of the function and meaning of the initial element rather than the discrete acquisition of the whole word.

The empirical data from all these sources strongly suggested that on psychological and linguistic grounds all prefixes in Table 1 could be taught after grade 3. All have some base words within the most common words of our language and most middle elementary schoolchildren are developmentally ready to understand the concepts or meanings expressed by all these prefixes. However, there appear to be two major types of constraints on the use of specific prefixes or specific prefixed words in middle-grade reading material. The first constraint relates to the natural context in which the prefixed word is apt to be used. Many prefixes, such as anti- or post-, are usually found in conceptually advanced reading material (e.g., anti-toxin or postgraduate). It is not so much the inherent difficulty of these prefixed words that would confine their use to higher grade levels as it is the conceptual difficulty of the

natural context in which the word is apt to be embedded. Thus, the use of many prefixed words must be guided by the use of developmentally appropriate subject matter.

The second constraint relates to the general nature of the base words to which many prefixes are typically attached. Many prefixes, particularly in- and its variants, are usually attached to base words (e.g., attentive or decisive) derived from Latin or Greek roots. Hence, they are attached to more learned or literate words. Many native prefixes, such as un- and mis-, can also be attached to learned words as well as to our basic Anglo-Saxon and French-derived core vocabulary.

These facts have significant implications for general vocabulary sequencing in reading instructional material. If knowledge of the base word is a prerequisite for understanding the prefixed word, and if many prefixes tend to be used with a learned vocabulary, then it behooves designers of reading series to ensure the increasing use of such learned words in reading selections, where they can be taught if they are not part of the child's oral vocabulary. The tendency in some of the most recent series (e.g., Scott-Foresman and Ginn 720) to use unadapted literary selections which contain a great deal of dialogue between children (or even adults) may raise difficulties if there is excessive use of such selections. The speaking vocabulary used by most children and adults in casual conversation is not typically a learned vocabulary. Literate base words will not occur in dialogue passages as often as they occur in third person narrative passages reflecting the natural language of mature and skilled writers. If students do not have sufficient opportunities to learn literate base words in their reading material, they will not easily learn many prefixed words. Thus, the use of many prefixed words at higher grade levels hinges upon the prior introduction and use of a literate vocabulary.

In conclusion, this section suggested how the principles and criteria proposed by O'Rourke for a program of systematic vocabulary study could be integrated into the design of a developmental reading program on a sound empirical basis. Only a rough ordering for the teaching and use of prefixes can be recommended or justified. The constraints that might apply to specific exemplars of prefixes do not preclude the meaningful use of some exemplars of every prefix by the upper elementary grades. At that level, it is possible to find or create appropriate content in which exemplars of all prefixes can be meaningfully embedded. What is necessary, however, is a careful coordination within each series to ensure that once exemplars are found in unadapted literary selections in a reader or are used in constructed or adapted selections, there are systematic opportunities at that grade level, in accompanying workbooks, and at succeeding grade levels for students to transfer meanings of prefixes learned in one selection to other exemplars in other selections.

IMPLICATIONS FOR FURTHER RESEARCH

An inspection of the total number of prefixed words, grade level after grade level in the tables accompanying each series of readers, indicated that as reading material increased in grade level or difficulty, the number of prefixed words increased regularly and dramatically by grade 6. The major implication of this phenomenon -- a pattern of general increase -- is that frequency of prefixation may serve as one index of conceptual or reading difficulty because it is an index of lexical maturity. How could this be so?

From an inspection of the Rinsland (1945) data, it was apparent that children's production of prefixed words is generally low in comparison to their use of base words, and it remains low throughout most of the elementary school years. Table 7 illustrates this point. It contains the first 13 pairs of prefixed words and their bases that could be found. The pattern is striking and informative. The appearance of a base word almost always precedes the appearance of the prefixed word. Moreover, regardless of when the base word appears, the prefixed word tends to appear, either absolutely or with greater frequency, towards the end of the elementary school years. Two issues can be approached on the basis of these data. First, they strongly support the statement that prefixes are usually attached to base words that are already known. Thus, availability of the base word is generally a necessary condition for using the prefixed word. However, it is not a sufficient condition. While children seem to understand the meaning of many prefixed words at an early age, their use of these words in writing in the early grades remains low and sporadic. A dramatic general increase in the use of prefixes tends to occur during the later elementary school years -- a period that coincides with the transition from Piaget's postulated stage of concrete operations to the stage of formal operations. It seems unlikely that this sudden increase could be accounted for by chiefly pedagogical or curricular influences. Thus, the data in Table 7 also suggest the influence of a developmental factor.

It is not difficult to see why frequent prefixation seems to coincide with intellectual maturation as one reflects upon the psychological process underlying prefixation. Prefixation involves

the mental capacity to think ahead in order to prepose a qualifying semantic element to the main semantic element. It is not unlike the preposing of a subordinate clause to the main clause it modifies - a process to which prefixation may be formally analogous. The frequent preposing of many kinds of dependent clauses to a main clause is also a characteristic of intellectual maturation (Cole, 1924).

Another way of describing prefixation is similar to the way Hunt (1965, 1970) characterized syntactic maturation in writing. He concluded from his examination of writing samples from students in grades 4,6,8,10, and 12 and from adults that syntactic growth was achieved by increasing the number of non-clause optional elements within one of the T-Unit clauses; as writers matured, they consolidated sentences to less than a predicate or less than a clause.[1] Prefixation too is optional; it consolidates the meaning of two or more simpler lexemes into one more structurally complex word with exactly the same meaning. Thus the production of a more complex lexeme by consolidating the meaning of several simpler semantic units may be analogous to the formation of more complex sentence structures by the transformation and consolidation of simpler grammatical structures.

If the use of prefixed words is optional, does their increasing use have any greater significance other than providing variety?

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[1]For example, according to Hunt (1970), a young child might write: "Aluminum is a metal and is abundant. It has many uses and it comes from bauxite. Bauxite is an ore and bauxite looks like clay." A mature student might write: "Aluminum is an abundant metal with many uses. It comes from an ore called bauxite that looks like clay."

Again, a reflection about the purpose served by the availability of more complex syntactic options is informative. While the increasing use of more complex syntactic structures reflects an underlying, maturing intellectual capacity, the deliberate use of complex structures enables writers or speakers to produce individual sentences containing a greater number of ideas. In other words, larger chunks of information can be presented at one point in time or space. Prefixation tends to accomplish the same goal within the framework of one lexical unit.

A concomitant of this fact is that prefixed words tend to be literate words. This may be so because the process of writing gives the mature writer the time necessary for revising and rethinking his verbalized thoughts so that he can consolidate his ideas into a more compact form. The "planning ahead" in prefixation is more difficult in spontaneous oral speech; it can be deliberately structured into written speech during revision, if not before. Thus, more frequent use of prefixation, regardless of the nature of the base word, may be more characteristic of written than oral language, and may thereby be a characteristic of literacy. This is a testable hypothesis.

If frequent prefixation is one reflection of mental maturity during the process of writing, then one could hypothesize that it could serve as one index of lexical maturation and, accordingly, conceptual difficulty in written language. Since the data in the

tables accompanying the reading series are derived from reading materials that extend up only to the sixth grade level, one area of future research could be an extension of this aspect of my research into secondary and adult reading materials in order to test the validity of this hypothesized index.

Another area of research would be a replication of the structure and procedures of the present study for the use of suffixes. A related area of investigation might be an adapted replication of the procedures of this study to discover for teaching purposes a selected number of often-used roots in words whose initial etymological element is related to a prefix that has already been taught.

Another possibility for research that could have direct curricular application would be the development of a "word-combining" program to enhance students' lexical skills similar to the sentence-combining programs that have already been developed to enhance students' syntactic skills in writing (e.g., O'Hare, 1973).

An area for research or exploration, and it deserves much consideration, is the whole question of what kinds of reading selections should constitute reading instructional material. Should there be a balance between adapted or constructed selections and unadapted ones? Do unadapted literary selections provide sufficient opportunities for developing all reading skills? Are exposure to literary language and the motivational element of a tale well-told adequate reasons for their inclusion in a developmental reading program? What is changed when a literary selection is adapted? If literary selections are to be used, what kind of vocabulary should one seek before a story is selected? How often should informational selections be used? Do

expository informational selections provide better material for teaching all reading skills than narrative literary selections? Could they incorporate more of the vocabulary of the content areas than they now do? These are such fundamental questions that one wonders why there appears to be so little published research on these matters in all the professional journals and texts that deal with the teaching of reading or the teaching of English.

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TABLE 1

GRADE LEVEL AT WHICH PREFIX IS FIRST INTRODUCED OR MENTIONED IN THE SIX READING SERIES*

Series	A&B	M	G 360	S-F	H	G 720
anti-	4	5		5	5	6
circum-			6		5	
co-		6		6	6	
counter-	4				5	6
de-			2		2	2
dis-	3	3	4	3	2	3
em-	6	6				
en-	4	5	4	4	2	4
extra-					6	
fore-		5	5	5	3	5
il-		6		4	5	
im-	3	3	4	4	4	4
in-	3	3	4	4	3	4
ir-		6		4	5	
inter-	5	6		6	6	6
intra-					6	6
mid-		5		5	3	
mis-	4	5		4	3	
non-	4	6	4	4	3	4
post-			6	6	5	6
pre-	4	5	3	4	4	2
pro-	4	6	5		4	5
re-	3	3	2	3	3	3
semi-	6				6	
sub-	4	5	4	6	2	5
super-		3		5	4	5
trans-	5	6		6	5	5
un-	3	2	3	2	2	3

*This list includes almost all elements termed prefixes by the six series that could be taught as prefixes, whether or not they were taught accurately. Excluded are all the number word parts, the prefixes a- (as in ablaze) and be-, the elements tele-, auto-, micro-, and bio-, and a group of prefixes that are more appropriately taught at the secondary school level: a- (meaning not), ab-, ante-, contra-, ex-, hyper-, meta-, per-, peri-, and pseudo-.

TABLE 2

APPEARANCE OF WORDS PREFIXED BY DIS- BY GRADE LEVEL
IN THE GRADES 4, 5, AND 6 READERS
IN THE SIX READING SERIES

Series	A&B			M			G 360			S-F			H			G 720		
Grade	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
disable		X						X									X	
disadvantage		X	X			X		X	X		X			X	X			X
disagree	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	
disappear	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
disapprove			X	X	X	X		X				X			X		X	
disarm	X														X			
disbelieve					X	X			X	X		X	X		X			X
discharge		X				X		X				X			X			
disclose												X						
discolor								X	X						X		X	X
discomfort						X								X				
disconnect						X						X						
discontent			X			X												
discontinue						X												
discourage		X	X		X	X	X			X	X	X	X	X	X			
discredit															X			
disembody									X									
disengage												X						X
disgrace			X	X	X	X		X							X			X
dishearten									X						X			X
dishonest					X	X			X			X			X			
disillusion									X									X
disinherit								X									X	
disintegrate									X							X		X
disinterest						X									X			
dislike				X	X	X	X	X	X				X		X		X	
dislocate									X									X
dislodge			X			X			X						X			X
disloyal			X															
dismast						X												
dismount	X				X	X	X		X		X			X	X			X
disobey				X		X	X		X	X				X	X		X	X
disorder		X			X	X			X		X	X						X
displace									X									
displease	X				X	X		X										
disprove						X		X									X	
disregard						X						X						
disremember					X													
disrepair						X												
disreputable												X						
disrespect							X											
distaste															X			
distrust		X					X	X				X			X		X	
Total Number	5	8	9	6	12	24	8	12	17	5	7	12	5	7	20	3	10	13

WORDS PREFIXED BY UN- IN THE GRADE 4 READERS
IN THE SIX-READING SERIES

Series	A&B	M	G360	S-F	H	G720
unable		x			x	x
unaccented		x				
unaware	x					
unbarred						x
unbelievable			x		x	
unbound		x				
unbraided		x	x			
unbroken		x				x
unbuckle			x		x	
uncertain		x	x	x	x	x
uncomfortable	x		x	x		x
unconcerned					x	
uncooked						x
uncover			x			x
uncrowded					x	
undisturbed		x				x
undo					x	
undoubted			x			
unearth		x	x			
uneasy	x	x	x	x	x	x
uneducated		x				
unending			x			
uneven		x	x	x	x	x
uneventful					x	
unexpected		x		x	x	x
unfair		x			x	
unfamiliar		x	x		x	x
unfit			x			x
unfold	x	x		x	x	
unforgettable			x			
unforgotten	x					
unfortunate			x	x	x	
unfriendly		x			x	
unfurl					x	
unguarded	x					
unhappy	x	x	x	x	x	x
unharness	x					
unhitch			x			
unhurried			x			
unhurt	x					
unimportant		x				
unimpressed					x	
uninjured			x			
uninteresting	x					
unjust		x				
unknown	x	x	x			x

WORDS PREFIXED BY UN- IN THE GRADE 4 READERS
IN THE SIX-READING SERIES

Series	A&B	M	G360	S-F	H	G720
unlatch					x	x
unlicensed		x				
unlike	x	x	x	x	x	
unload	x	x	x	x	x	
unlock		x	x	x		x
unlucky		x	x		x	
unmake						x
unmapped		x				
unmistakable					x	
unmoved						x
unnecessary		x		x		
unnerve					x	
unnoticed		x				
unpack		x			x	
unpleasant		x	x			
unplug					x	
unpopular			x			x
unprepared		x				
unravel					x	
unreasonable						x
unrewarded					x	
unroll	x		x	x		
unruffled	x					
unsafe				x		
unscrew	x					
unseat		x				
unseen	x	x				x
unselfish		x				
unsolved		x				
unsteady					x	
unsung		x				
unswerving			x			
untamed		x				
untangle			x			
untidy						x
untie	x	x	x	x		
untold			x			
untouched			x			x
untrained		x				
untrick			x			x
untroubled					x	
untwist			x			
unused				x		
unusual	x	x	x	x	x	x
unwanted		x		x		
unwary			x			

WORDS PREFIXED BY UN- IN THE GRADE 4 READERS
IN THE SIX-READING SERIES

Series	A&B	M	G360	S-F	H	G720
unwind				x		x
unwilling	x	x			x	
unwise		x				
unworthy	x		x			
unwrap	x		x			x
unwritten	x	x				
unzipper					x	
Total Number	23	44	38	19	34	28

RANK ORDER FREQUENCY RANGE FROM CARROLL, DAVIES, AND RICHMAN (1971) OF SELECTED PREFIXED WORDS AND THEIR BASES AND THEIR GRADE LEVEL PLACEMENT IN HARRIS AND JACOBSON (1972)

	Grade Level							
	3	4	5	6	RO-PW	RO-BW	HJ-PW	HJ-BW
counteract	0	0	1	1	24800-24900	1000-1100	--	2
counterattack	0	1	0	0	29900-30000	1700-1800	--	3
counterbalance	0	0	0	1	32200-32300	1700-1800	--	4
counterclockwise	1	0	4	0	18700-18800	10200-10300	6	6
countermelody	1	0	0	1	53500-53600	4500-4600	--	5
counterpart	1	0	0	0	21800-21900	100-200	--	2
counterpoint	0	0	6	0	24900-25000	200-300	--	2
disagree	4	0	3	6	8200-8300	1700-1800	6	3
disappear	12	19	7	14	4400-4500	1100-1200	3	3
discontent	3	0	2	0	14200-14300	3200-3300	6	3
discourage	2	2	1	4	12100-12200	2000-2100	5	3
disliked	4	4	4	1	10400-10500	800-900	3	1
disorder	1	4	0	5	13200-13300	300-400	4	3
forecasts	5	2	5	5	12200-12300	10000-10100	6	4
forefathers	1	4	2	1	11000-11100	4400-4500	--	1
forefeet	2	1	1	2	20800-20900	200-300	--	1
forefinger	1	2	3	2	10200-10300	1200-1300	--	2
forehead	10	22	13	13	3800-3900	200-300	4	1
foreman	7	2	4	4	9800-9900	100-200	5	1
mid-air	1	0	0	3	16600-16700	100-200	--	2
midday	3	1	3	8	9300-9400	100-200	6	1
midnight	10	25	25	19	3100-3200	200-300	5	1
midsummer	2	2	1	1	12800-12900	400-500	--	2
midway	3	2	0	4	10300-10400	0-100	5	1
misfortune	3	0	2	6	9900-10000	3800-3900	6	3
misleading	0	1	0	0	14100-14200	1600-1700	--	3
misplaced	0	1	1	0	27500-27600	700-800	6	2
misspelled	24	36	32	33	6600-6700	1900-2000	6	4
misunderstanding	0	0	2	1	11900-12000	1500-1600	--	3
misuse	1	0	1	0	19500-19600	0-100	--	2
precaution	0	0	1	0	18600-18700	6900-7000	6	6
predetermined	0	1	0	0	24400-24500	2100-2200	--	5
preflight	4	0	0	0	44400-44500	1400-1500	--	4
prehistoric	3	1	6	7	5800-5900	5200-5300	5	5
pre-season	0	0	0	1	54000-54100	1200-1300	--	3
preview	0	0	1	0	12800-12900	1500-1600	--	3
subcontinent	0	0	1	7	22000-22100	2000-2100	--	5
subdivisions	0	3	0	2	12300-12400	3800-3900	--	6
subheadings	0	2	4	0	20200-20300	5000-5100	--	4
subsoil	0	1	1	0	26900-27000	700-800	--	4
subtopics	0	2	4	6	15300-15400	2300-2400	--	5
subway	10	3	5	1	7100-7200	0-100	5	1
superhighway	7	15	0	1	12700-12800	2200-2300	--	4
superimposed	0	0	2	1	22300-22400	9900-10000	--	--

RANK ORDER FREQUENCY RANGE FROM CARROLL, DAVIES, AND RICHMAN (1971) OF SELECTED PREFIXED WORDS AND THEIR BASES AND THEIR GRADE LEVEL PLACEMENT IN HARRIS AND JACOBSON (1972)

	Grade Level							
	3	4	5	6	RO-PW	RO-BW	HJ-PW	HJ-BW
supermarket	9	3	3	3	8800-8900	1200-1300	6	3
supernatural	0	0	2	3	13000-13100	600-700	6	4
superstars	0	1	0	0	54200-54300	700-800	--	2
superstructure	1	0	0	0	43900-44000	1400-1500	--	4

FREQUENCY OF APPEARANCE BY GRADE LEVEL OF SELECTED PREFIXED WORDS FROM THE RINSLAND (1945) DATA

Grade Level	1	2	3	4	5	6	7	8
disagreeable	1	-	-	-	2	-	6	6
disappear	-	1	1	1	2	1	8	13
disappeared	3	2	4	11	12	8	30	96
discouraged	-	-	2	1	4	1	17	8
disobey	-	-	5	2	3	-	2	1
disobeyed	1	-	1	-	3	4	2	4
forefathers	-	-	-	2	2	2	7	9
forehead	1	1	1	5	16	4	5	18
foreman	-	-	2	-	1	4	8	6
forenoon	-	1	-	1	7	15	3	1
impatient	-	-	22	1	1	4	36	7
impolite	-	-	31	-	2	3	-	2
impure	-	-	5	-	1	4	5	2
incorrect	-	-	5	-	-	-	-	50
midnight	-	-	10	15	18	11	36	53
midsummer	-	1	-	-	2	-	1	4
mid-term	-	-	-	2	2	-	5	-
midway	-	-	5	-	1	32	3	1
misfortune	-	-	1	-	-	-	5	2
mispronounce	-	-	2	-	-	7	-	-
mispronounced	-	-	6	-	-	-	-	1
misspelled	-	-	1	3	7	3	-	-
misunderstand	-	-	3	-	-	10	-	3
misunderstood	-	-	6	-	-	4	-	3
unbroken	-	-	-	2	1	3	4	-
unbutton	14	-	11	-	-	-	-	-
uncertain	-	-	3	-	6	-	2	1
uncomfortable	-	-	5	1	4	7	7	10
unconscious	-	-	1	5	-	6	12	22
uncovered	1	2	1	3	1	4	2	9
undone	5	-	-	-	1	2	-	-
undress	-	-	4	1	1	1	2	5
unfriendly	-	-	2	2	-	-	5	4
unhappy	-	3	8	20	15	26	18	24
unknown	-	1	3	6	8	106	16	25
unloaded	2	-	6	9	4	20	8	14
unlock	1	-	6	2	1	3	2	4
unlocked	4	-	1	4	1	3	8	12
unlucky	-	-	1	2	8	-	3	14
unpleasant	-	-	1	2	4	3	2	13
untie	-	21	23	47	3	10	1	2
untied	-	-	5	9	2	4	7	6
unusual	1	1	2	3	7	5	16	21
unwrapped	2	-	3	7	6	-	1	6

TABLE 6

FAMILIARITY SCORES OF FOURTH GRADERS FOR SELECTED PREFIXED WORDS FROM DALE-EICHHOLZ (1960)*

Words	Scores
disloyal	73%
dismount	70%
misbehave	86%
misconduct	67%
misplace	76%
unafraid	77%
unbalanced	76%
unburned	84%
unexplored	71%
unheard	88%
uninvited	89%
unmarried	80%
unnatural	88%
unprepared	84%
unquestioned	86%
unsatisfied	93%
unwritten	89%

*Word with scores of 67% or more are considered "known" on the average at this grade level.

TABLE 7

FREQUENCY OF APPEARANCE BY GRADE LEVEL OF SELECTED PAIRS OF BASE WORDS AND PREFIXED WORDS FROM THE RINSLAND (1945) DATA AND THEIR GRADE LEVEL PLACEMENT IN HARRIS AND JACOBSON (1972)

Grade	1	2	3	4	5	6	7	8	H-J
equal	-	-	-	7	26	13	17	23	4
unequal	-	-	-	-	-	-	-	3	6
employed	-	-	-	-	-	1	-	8	5
unemployed	-	-	-	-	-	-	-	4	-
fortunate	-	-	-	-	2	3	49	17	4
unfortunate	-	-	1	1	-	1	6	22	6
important	8	4	14	53	85	143	311	428	3
unimportant	-	-	-	-	-	-	1	20	6
inhabited	-	-	-	-	-	1	4	21	5
uninhabited	-	-	-	-	-	-	-	3	-
injured	-	-	16	1	11	21	14	27	5
uninjured	-	-	1	-	-	-	-	4	-
direct	-	-	-	1	-	12	9	16	3
indirect	-	-	-	-	-	-	1	9	5
formal	-	2	-	-	6	7	-	9	5
informal	-	-	-	-	1	-	-	9	5
regular	11	1	7	9	19	34	49	49	4
irregular	-	-	-	-	-	5	2	5	6
force	-	-	-	10	8	8	29	62	3
enforce	-	-	-	-	-	46	4	17	5
forced	-	-	-	-	5	9	44	76	3
enforced	-	-	-	-	-	1	-	12	5
understand	10	3	26	12	21	48	53	72	3
misunderstand	-	-	3	-	-	10	-	3	-
understood	-	1	4	4	2	29	17	19	3
misunderstood	-	-	6	-	-	4	-	3	-